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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Summer 2025
Course Code: CSE311 , Course Title: Database Management System
Level: 3 Term:2 Batch: 65

Time: 02:00 Hrs **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1 a) A retail company maintains the following table to track customer orders. Over time, they noticed data redundancy and inconsistencies, especially when updating customer or product information.

C_ID	C__Name	phone	OrderID	OrderDate	ProductID	ProductName
C001	Alice Ahmed	11111	O1001	2025-07-01	P101, P102	Mouse, Keyboard
C003	Nadia Hasan	33333	O1003	2025-07-03	P103	HDMI Cable

Apply the principles of database normalization to systematically transform the table step by step into Third Normal Form (3NF). Clearly demonstrate each step (1NF, 2NF, 3NF) by identifying anomalies. — **6** — **CO1**

b) **Explain** the concepts of Distributed Systems and Data Warehousing. How do they work together to manage and analyze large-scale data? Provide an example. — **4** — **CO1**

2 a)

- doctors(doctor_id, name, department)
- treatments(treatment_id, treatment_name, doctor_id)
- patient_visits(visit_id, treatment_id, patient_name, status, visit_date)

Based on the given Schemas, **construct** the SQL queries to answer the following questions:[2*5] — **10** — **CO2**

i) List all treatments along with the name of the doctor who provides each treatment.

ii) Show each patient's name and the treatment they received.

iii) Display each doctor's name and the number of unique patients they have treated. Order the results by the number of patients in descending order.

iv) List doctors who have treated more than 5 patients, showing their name, department, and the total number of patient visits.

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		v)List all patient visits where the treatment name contains "therapy", the visit status is "completed", and the doctor's department is "Cardiology". Show the patient name, treatment name, doctor name, visit date, and status.		
	b)	Based on the provided Q2(a) schemas, answer the following questions: [6+4] **i) Construct** a stored procedure named addPatientVisitWithTransaction that accepts treatment_id, patient_name, status, and visit_date as parameters. The procedure Validate that status is either 'Completed' or 'Cancelled'. Insert the visit record into patient_visits.Use a transaction to ensure the insert is committed only if validation passes; otherwise rollback with an error. ii)**Construct** a BEFORE INSERT trigger named *preventDuplicatePatientVisit* on the patient_visits table. The trigger should prevent the insertion of a new record if a patient already has an existing visit for the same treatment on the same visit date. If such a duplicate is detected, the trigger must raise an error with the message: "Duplicate patient visit not allowed for same treatment and visit date".	**10**	
3	***a)***	A multinational e-commerce company stores customer profiles, transaction history, and product inventory in a single centralized database. Recently, they faced: • Customers from Asia experience high latency when accessing their data. • Support staff in one region were found accessing payment details of customers from other regions. • Sensitive payment details were at risk of being exposed during internal data exchange. **Analyze** the database challenges faced by the multinational e-commerce company, including high latency, unauthorized access, and data exposure. Based on your analysis, suggest suitable data distribution techniques, access control mechanisms, and encryption methods to address these issues.	**5**	**CO3**
	b)	**Illustrate** how the following two relational tables can be represented in any two different NoSQL formats. Then, explain which model—NoSQL or Relational—would be more suitable for this system. **Relational Tables:** • **doctors** (doctor_id, name, department) • **treatments** (treatment_id, treatment_name, doctor_id, cost)	**5**	

doctors

doctor_id	name	department
D01	Dr. Smith	Cardiology
D02	Dr. Adams	Neurology

treatments

treatment_id	treatment_name	doctor_id
T101	Heart Surgery	D01
T102	ECG	D01
T103	Brain Scan	D02